Assignment 7
Lecture Preparation
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CSC 585

1.3

1. $h(x) = \sin(x^2)$
$g(x) = x^2$
$f(u) = \sin(u)$
$f'(u) = \cos(u)$
$g'(x) = 2x$
$h'(x) = \cos(x^2) \cdot 2x$

2. $h(x) = [\sin(x)]^2$
$g(x) = \sin(x)$
$f(u) = u^2$ where $u = \sin(x)$
$f'(u) = 2u$
$= 2\sin(x)$
$g'(x) = \cos(x)$
$h'(x) = 2\sin(x) \cdot \cos(x)$

using $(f \circ g)'(x) = f'(g(x))\, g'(x)$

2 The reason that the two dimensional Euler-Lagrange equations,

$$F_u - \frac{\partial}{\partial x} F_{u_x} - \frac{\partial}{\partial y} F_{u_y} = 0 \quad \text{and}$$

$$F_v - \frac{\partial}{\partial x} F_{v_x} - \frac{\partial}{\partial y} F_{v_y} = 0$$

hold is that the one dimensional Euler-Lagrange result could be used along with taking partial derivatives of the two dimensional integral of $I(u,v)$ first wrt to u holding v constant and then do the same thing wrt to v while holding u constant to derive them and then applying the one dimensional form

3. $$\left.\begin{aligned} F_u &= 2\lambda E E_x \\ F_{u_x} &= 2u_x \\ F_{u_y} &= 2u_y \\[1em] F_v &= 2\lambda E E_y \\ F_{v_x} &= 2v_x \\ F_{v_y} &= 2v_y \end{aligned}\right\}$$

$E = E_x u + E_y v + E_t$

$$2\lambda E E_x - \frac{\partial}{\partial x} 2u_x - \frac{\partial}{\partial y} 2u_y = 0$$

$$2\lambda E E_y - \frac{\partial}{\partial x} 2v_x - \frac{\partial}{\partial y} 2v_y = 0$$